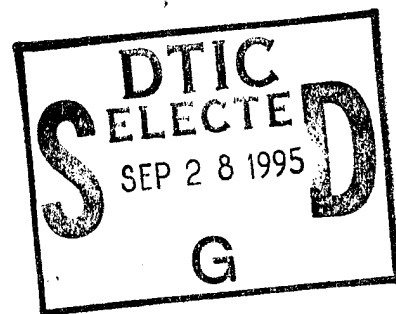


DEVELOPMENT OF AN ULTRA-SAFE RECHARGEABLE  
LITHIUM-ION BATTERY



Contract # N00014-94-C-0141  
ARPA Order # 9332004arp01/13 APR 1994/313ES

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R & D Status Report #8

Reporting Period: 16 May to 15 June, 1995

Submitted by:

The Electrofuel Manufacturing Company Inc.

DTIC QUALITY INSPECTED 5

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# DEVELOPMENT OF AN ULTRA-SAFE RECHARGEABLE LITHIUM-ION BATTERY

## R&D STATUS REPORT 1931-1008/0

ARPA Order No.: 9332004arp01/13APR1994/313ES  
Program Code No.: ARPA-BAA93-32  
Contractor: The Electrofuel Manufacturing Company Inc.  
Contract No.: N00014-94-C-0141 Contract Amount: \$1271728.  
Effective Date of Contract: August 15, 1994  
Expiration Date of Contract: February 14, 1996  
Principal Investigator: J.K. Jacobs  
Telephone No.: (800) 388-2865  
Short Title of Work: Lithium-ion Battery Development  
Reporting Period: May 16, 1995 to June 15, 1995

### Description of Progress:

Work is accelerating in a number of areas simultaneously.

The basic flexible prototype production line was assembled during this period and startup was achieved. After startup, work was begun to optimize various aspects of the battery production process. Control and stabilization of temperature of laminator was found to be important. This was achieved by using a oil flow heater through the laminator drum. The surface of the laminator drum initially was a hard rubber. After testing, this was found unsatisfactory and electrode material was being shifted on the foil and good uniformity of coating was not being achieved. A hard chrome coated drum was found to have the proper surface properties and this will be used for all future work.

The speed of laminator and the speed of the unwinding equipment was matched carefully. This balance was achieved through good electronic control and found to be most important. A master speed control unit was assembled for this operation.

Modification of air chucks were changed from four moving parts to three fixed and one moving part. This gave more precision control over the alignment. Alignment is very critical as one is using 0.0005" thickness aluminum foil which is very fragile and needs more precise alignment to prevent wrinkling.

The curtain coater was constructed and tested with a standard adhesive polyester mix. It was found that the material flowed well and coated the test polyethylene foil. Tests with actual electrode material will be done next month.

Handcrafted cells continued to be produced to test different cell chemistry and production techniques. For ease of use exmet current collectors attached to the electrodes through cold glue was used. A number of cells are being cycled. Inorder to observe the cell behavior plain polyethylene film was used for cell containment to allow us to see the cell components and how they behaved. The positive result is that there were no signs of delamination and the initial cell impedances were low. However, polyethylene films allow moisture to ingress along with high rate of solvent egress. Thus these cells were used for quick preliminary tests.

Change in Key Personnel: None

Summary of Substantive Information Derived from Special Events:  
None:

Problems Encountered and/or Anticipated: None

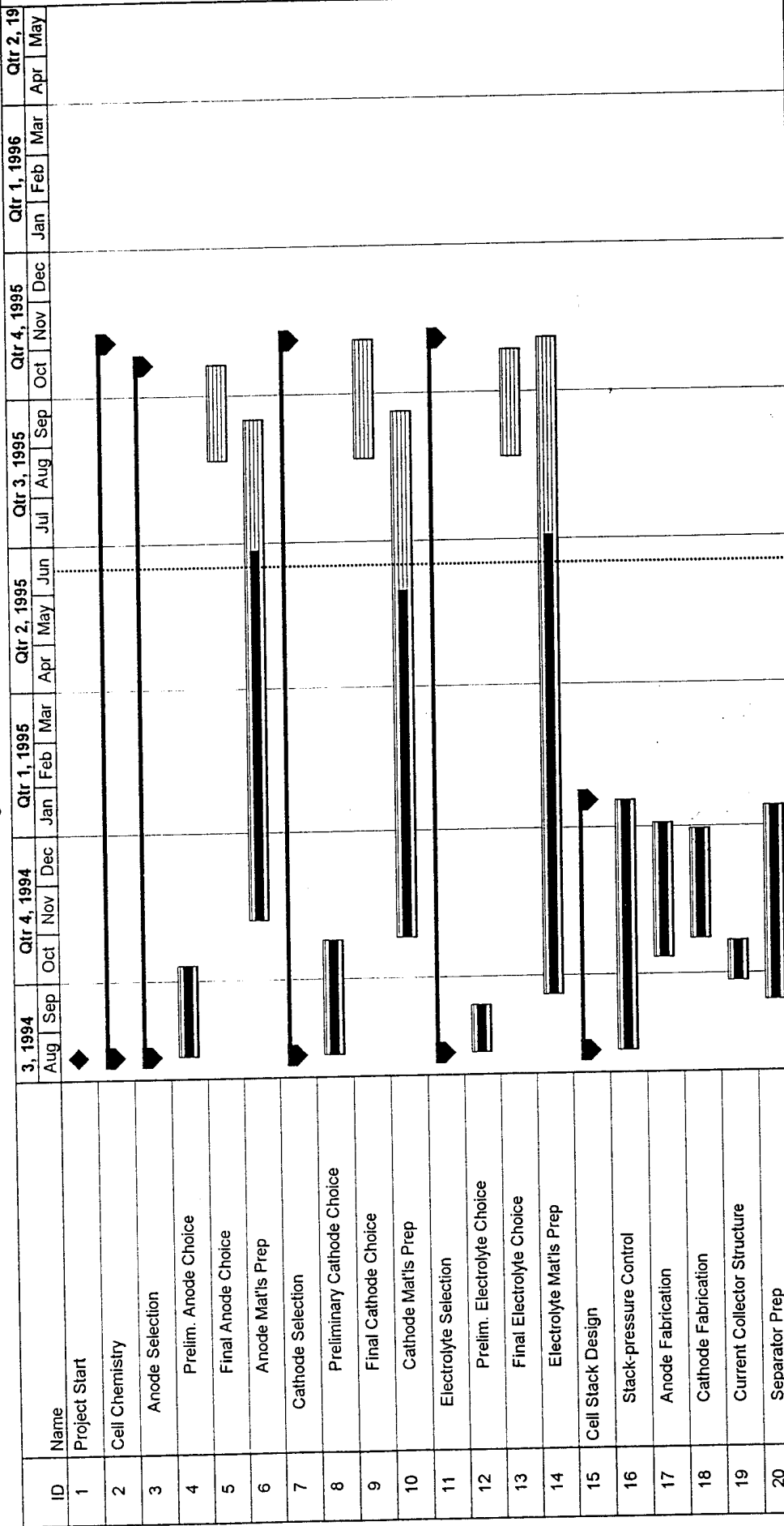
Action Required by the Government: None

Fiscal Status:

	Total Est- imate of Program	US Govt Funding Obliga- tion	Electro fuel Contri- bution
(1) Amt. currently provided on contract:	\$1630421	\$1271728	\$358693
(2) Expenses & commitments to date:	\$ 650267	\$ 507208	\$143059
(3) Funds required to complete work:	\$ 980154	\$ 764520	\$215634

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Figure 1: Gantt Chart



Summary  
Rolled Up

Progress  
Milestone

Critical  
Noncritical

Project: Li-Ion Battery  
Date: 8/16/95

Figure 1: Gantt Chart

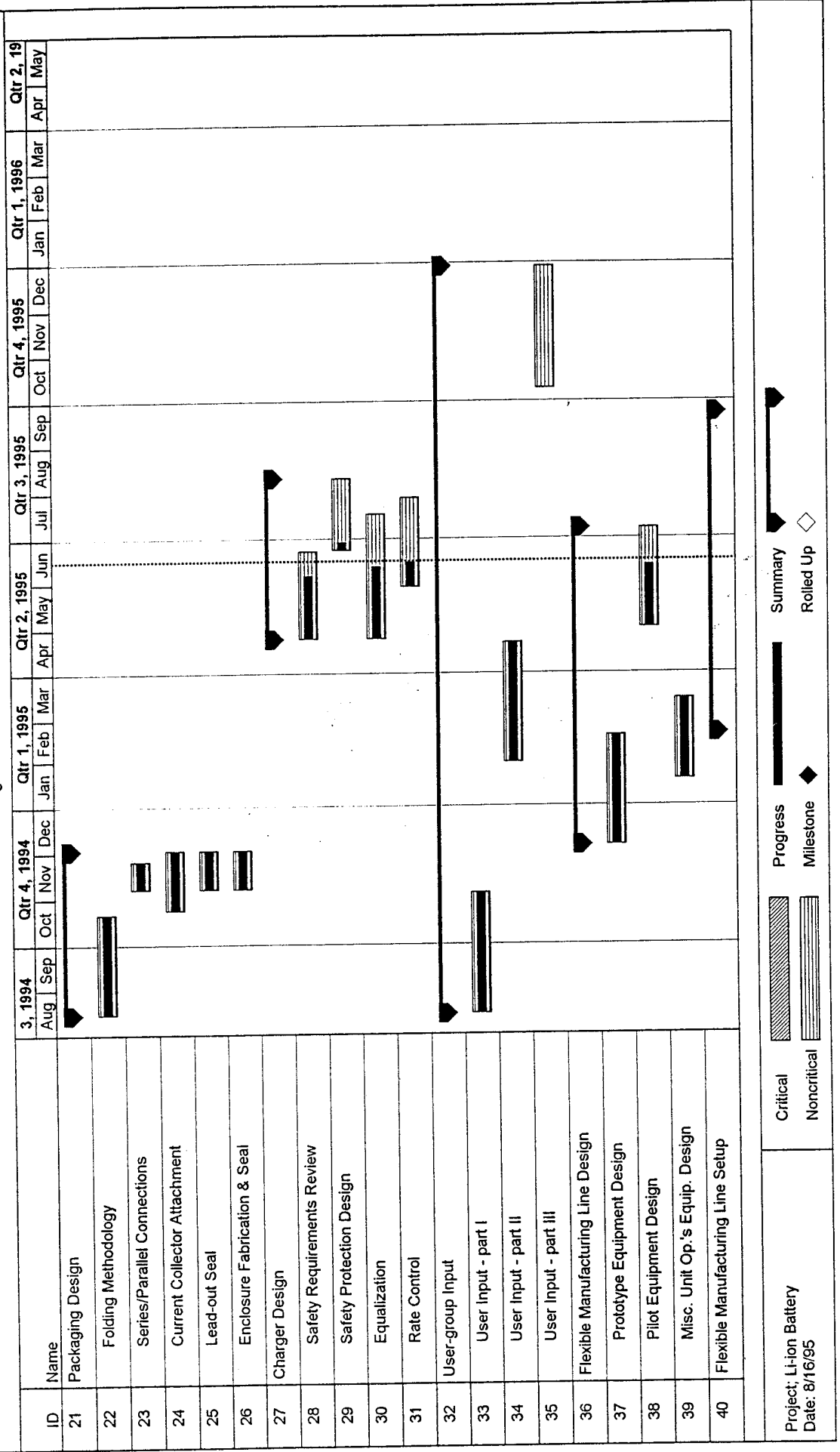
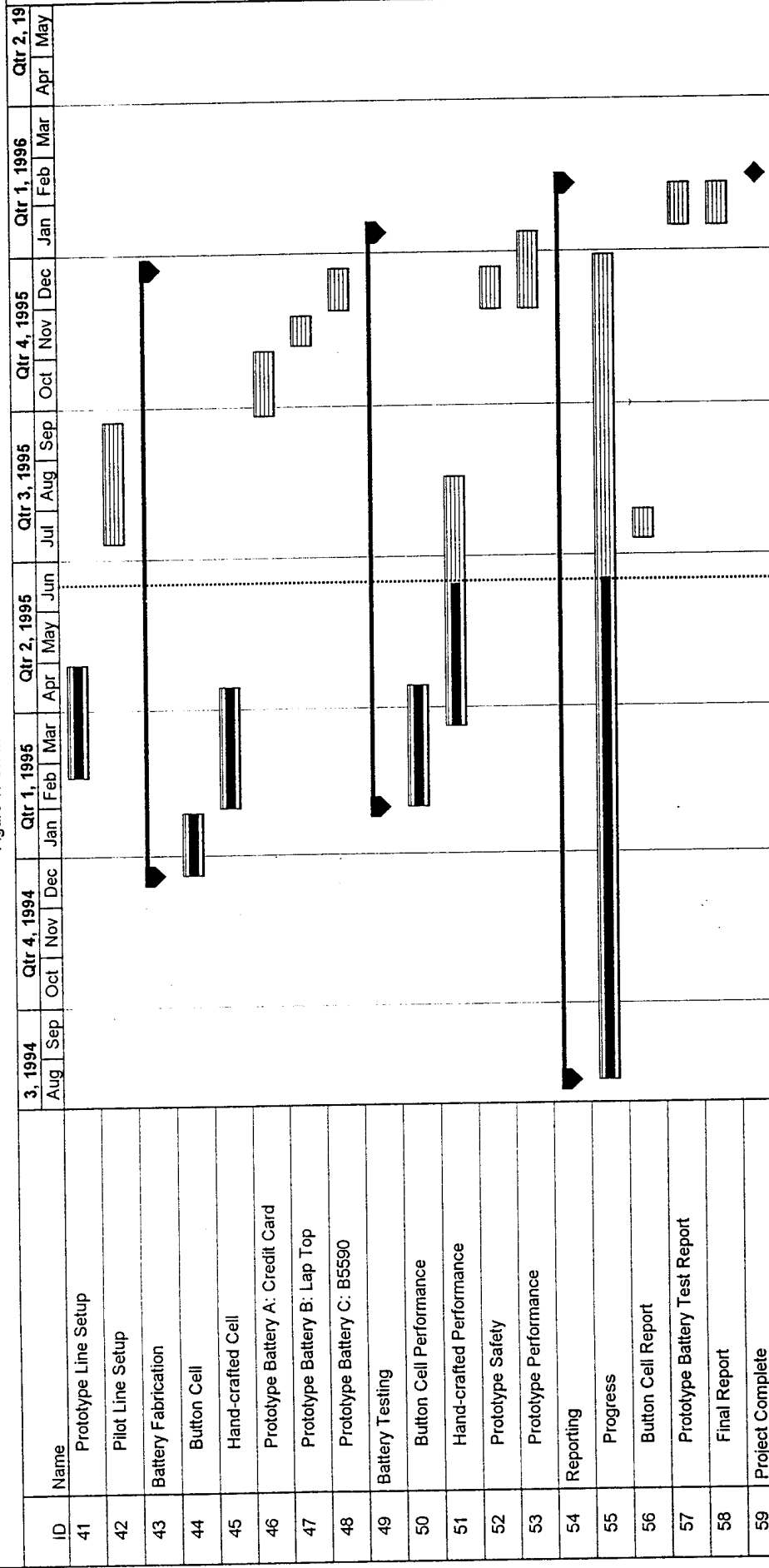


Figure 1: Gantt Chart



Project: Li-ion Battery  
Date: 8/16/95